

**УНИВЕРЗИТЕТ „ГОЦЕ ДЕЛЧЕВ“ - ШТИП
ФАКУЛТЕТ ЗА ИНФОРМАТИКА**

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2012
YEARBOOK
2012**

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VOLUME I

**GOCE DELCEV UNIVERSITY - STIP
FACULTY OF COMPUTER SCIENCE**

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BITCOIN SCHEMES- INOVATION OR A THREAT TO FINANCIAL STABILITY?

Violeta Madzova PhD²³

Abstract:

A virtual currency can be defined as a type of unregulated, digital money, which is issued and usually controlled by its developers, and used and accepted among the members of a specific virtual community. The recent developments in widely spread internet and data mining activities, highlighted the issue of accepting and using virtual currencies for different purposes, including, buying commodities or services, saving, as well as converting into real currencies, such as US dollars, euro or other currencies.

One of the most controversial and the most advanced virtual currency scheme to date is the one so-called Bitcoin, designed and implemented by the Japanese programmer Satoshi Nakamoto in 2009. Although the use of Bitcoin might have positive impact on financial innovation and the provision of additional payment alternatives to consumers, it also might increase the risks in financial payments, exchange rates of real currencies, as well as increase the possibility of money laundering, using them for illegal deeds.

Therefore, the purpose of this paper is to clarify the main characteristics of Bitcoin, and analyze its positive aspects as well as the threats that may occur to the modern world economy, in case the usage of this money, significantly increases.

Keywords: virtual currency, e-money, financial and price stability, risks

Introduction

Money is a social institution: a tool created and marked by society's evolution, which has exhibited a great capacity to evolve and adapt to the character of the times. Economists differentiate among three different types of money: **commodity money**, **fiat money**, and **bank money**. While **commodity money** (such as gold coins) is no longer performing its original function, so called "**fiat money**"²⁴, as well as **bank money** (checks issued by banks) have taken its place and are widely used in all modern economies.

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²⁴ Fiat money is a good, the value of which is less than the value it represents as money. Dollar bills and banknotes are examples of fiat money.

Being issued by the central banks, people have accepted fiat money in exchange for goods and services, simply because they trust this central authority which is crucial element of any fiat money system.

Additional reason for wide acceptance of fiat money is of course, possibility to unite three different money functions into one, i.e. money can be:

- used as a mean of exchange -intermediary in trade to avoid barter system,
- used as a standard numerical unit for the measurement of value .
- saved and used as a store of value for the future times.

Due to the recent technological developments and especially high penetration of the internet, there has also been a development of virtual communities in recent years. A virtual community²⁵ is to be understood as a place within cyberspace where individuals interact and follow mutual interests or goals. In some cases, these virtual communities have created and circulated their own digital currency for exchanging the goods and services they offer, thereby creating a new form of digital money . These money can have positive aspects if they contribute to financial innovation and provide additional payment alternatives to consumers.

However, it is clear that they can also pose risks for their users, especially in view of the current lack of regulation. In fact, virtual currencies act as a medium of exchange and as a unit of account within a particular virtual community. The question then arises as to whether they also fulfil the “store of value” function in terms of being reliable and safe, or whether they pose a risk not only for their users but also the wider economy.

Virtual currency schemes in the new e-communities

A virtual currency can be defined as a type of unregulated, digital money, which is issued and usually controlled by its developers, and used and accepted among the members of a specific virtual community.

The virtual currency schemes are still new and there is still vague understanding of their nature, thus mix them with so called “electronic money”. Namely, as it is stated in the Electronic Money Directive (2009/110/EC), “electronic money” is monetary value as represented by a claim on the issuer which is: stored electronically; issued on receipt of funds of an amount not less in value than the monetary value issued; and accepted as a means of payment by undertakings other than the issuer.

²⁵ There are many examples of virtual economies, in terms of social networks(Facebook, MySpace, Twitter), knowledge virtual community (Wikipedia), or those that create a virtual world (Second Life) or create an online environment for gambling (Online Vegas Casino).

Although some of these criteria are also met by virtual currencies, a clear distinction should be made between virtual currency schemes and electronic money. i.e:

- In electronic money schemes the link between the electronic money and the traditional money format is preserved and has a legal foundation, as the stored funds are expressed in the same unit of account (e.g. US dollars, euro, etc.).
- In virtual currency schemes the unit of account is changed into a virtual one.
- Electronic money schemes are regulated and electronic money institutions that issue means of payment in the form of electronic money are subject to prudential supervisory requirements. This is not the case for virtual currency schemes.
- Electronic money is primarily subject to the operational risk associated with potential disruptions to the system on which the electronic money is stored.
- Virtual currencies are not only affected by credit, liquidity and operational risk without any kind of underlying legal framework, these schemes are also subject to legal uncertainty and fraud risk, as a result of their lack of regulation and public oversight.

It is important to underline that, there three types of virtual currency schemes which depends on their interaction with traditional, “real” money and the real economy:²⁶

- **Type 1**, which is used to refer to closed virtual currency schemes, basically used in an online game;
- **Type 2** virtual currency schemes have a unidirectional flow (usually an inflow), i.e. there is a conversion rate for purchasing the virtual currency, which can subsequently be used to buy virtual goods and services, but exceptionally also to buy real goods and services;
- **Type 3** virtual currency schemes have bidirectional flows, i.e. the virtual currency in this respect acts like any other convertible currency, with two exchange rates (buy and sell), which can subsequently be used to buy virtual goods and services, but also to purchase real goods and services.

One of the most typical and developed “type 3” virtual currency is so called Bitcoin. In fact Bitcoin shares characteristics of both commodity money and fiat money, but does not fit properly in either category. Bitcoin supersedes

²⁶ See more : BRODBECK, Simon “Virtual money – A new form of privately issued money in the money market”, European School of Management, Paris, May 2007.

commodity money in value density, recognizability and divisibility. It also resembles commodity money in that, at least during the expansion of the Bitcoin base, its value, assuming competing suppliers, is equal to its marginal cost of production. However, unlike commodity money, bitcoins, which exist only as numbers in a computer, have zero value as a commodity in the real world. On the other hand, fiat money commands a value far higher than its costs of production, which raises the risk of mismanagement by their monopolistic suppliers.

The nature of a Bitcoin as a virtual currency scheme

Bitcoin is decentralized virtual currency, which is traded on line and is exchanged into US dollars or other currencies. Bitcoin, allows users to mine buy, sell or accept bitcoins from anywhere in the world. However, no matter how much worldwide bitcoin community is spread over, it doesn't have centralized data base or authority, but a peer to peer network. It enables creation of bitcoins through mining process and validates the transactions. According to the latest information there are over 8,8 million coins in circulation²⁷. Estimating the bitcoin price at the level of 4-5US dollar/per 1 Bitcoin, the Bitcoin community value is estimated between 35-44 million US dollars.

According to Bitcoin, the scheme has been technically designed in such a way that the money supply will develop at a predictable pace. The number of Bitcoins generated per block is set to decrease geometrically, with a 50% reduction every four years. The result is that the number of Bitcoins in existence will reach 21 million in around 2040. (see: Table 1)

²⁷ European Central Bank, "Virtual currency schemes" October 2012, pg 18
<http://www.ecb.europa.eu/home/html/index.en.htm>

Table 1: Trend of bitcoin over time



Source : <http://www.ecb.int/pub/pdf/other>

Bitcoins are not pegged to any real-world currency. The exchange rate is determined by supply and demand in the market.

There are several exchange platforms for buying Bitcoins that operate in real time, such as Mt.Gox which is the most widely used currency exchange platform and allows users to trade US dollars for Bitcoins and vice versa.

In order to start using Bitcoins, users need to download the free and open-source software. Purchased Bitcoins are thereafter stored in a digital wallet on the user's computer. Consequently, users face the risk of losing their money if they don't implement adequate antivirus and back-up measures.

However, it is also true that the system demonstrates a clear case of information asymmetry. It is complex and therefore not easy for all potential users to understand. At the same time, users can easily download the application and start using it even if they do not actually know how the system works and which risks they are actually taking. This fact, in a context where there is clear legal uncertainty and lack of close oversight, leads to a high-risk situation.

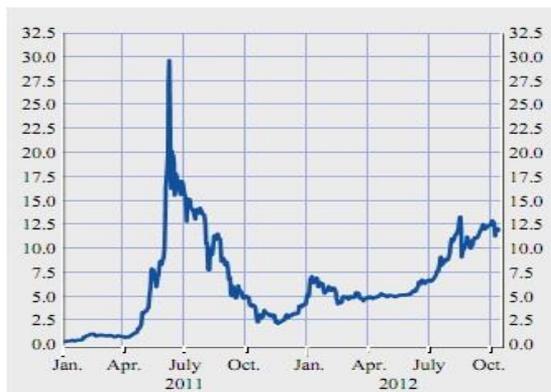
The turbulent path of a Bitcoin

Bitcoin, the infamous pseudonymous cryptocurrency with no centralized authority, has had a tumultuous history so far. In 2008, Satoshi Nakamoto self-

published a paper outlining his work on The Cryptography Mailing list at metzdowd.com and then on 3 January 2009 released the open source project called Bitcoin and created the first block, called the “Genesis Block”²⁸. Through 2009 and early 2010, bitcoins had no value at all, and for the first six months after they started trading in April 2010, the value of one bitcoin stayed below 14 cents. Then, as the currency gained viral traction in summer 2010, rising demand for a limited supply caused the price on online exchanges to start moving so by November 2010, it surged to 36 cents, while in February 2011, it rose again and it hit USD 1,06 before settling in at roughly 87 cents. From early April 2011 to the end of May 2011, the going rate for a bitcoin rose from 86 cents to USD 8,89. The highest price was reached at the beginning of June when the market value of all bitcoins in circulation has tripled and was approaching USD 130 million. Then, a cyberattack perpetrated on 20 June 2011, managed to decrease the value of the currency down from USD 17,50 to USD 0,01 within several minutes. According to currency exchange Mt.Gox platform, one account with a lot of Bitcoins was compromised and the stolen lot was first sold out and then bought back again, with the intention of withdrawing the coins. The USD 1,000/day withdrawal limit was active for this account and the hacker was only able to exchange USD 1.000 worth of Bitcoins. Apart from this, no other accounts were compromised, and nothing was lost. The price dramatically dropped down, but it quickly drove it back up, limiting the thief’s haul to only around 2.000 bitcoins. The exchange ceased operations for a week and rolled back the post-crash transactions, but the damage had been done as the bitcoin never got back above \$17.²⁹ (see Table 2)

²⁸ Benjamin Wallace, “The rise and fall of a BITCOIN”; November 23,2011, pg2

Table 2: Bitcoin exchange rate over time



source: <http://bitcoincharts.com /charts>

Monetary aspects of the Bitcoin virtual currency scheme

As the Bitcoin scheme is designed as a decentralized system where no central monetary authority is involved, the supply of money does not depend on the monetary policy of any virtual central bank, but rather evolves based on interested users performing a specific activity.

Therefore, users have several incentives to use Bitcoins.

1. Transactions are anonymous, as accounts are not registered and Bitcoins are sent directly from one computer to another.
2. Users have the possibility of generating multiple Bitcoin addresses to differentiate or isolate transactions.
3. Transactions are carried out faster and more cheaply than with traditional means of payment. Transactions fees, if any, are very low and no bank account fee is charged.

Bitcoin users buy and sell the currency among themselves without any kind of intermediation and therefore, it seems that nobody benefits from the system, apart from those who benefit from the exchange rate evolution (just as in any other currency trade) or those who are hard-working “miners” and are therefore rewarded for their contribution to the security and confidence in the system as a whole. Also, the scheme does not promise high returns to anybody. Although some Bitcoin users may try to profit from exchange rate fluctuations, Bitcoins are not intended to be an investment vehicle, just a medium of exchange.

However there are still concerns if the Bitcoin schemes might generate potential risks regarding payment or even financial stability in the modern economies. Having in mind the small scope of all virtual currency

schemes including Bitcoins, these risks do not affect anyone other than the users of the schemes. But, it can be expected that the growth of virtual currencies will most likely continue, triggered by several factors:

- a) the growing access to and use of the internet and the growing number of virtual community users,
- b) the increase of electronic commerce and in particular digital goods, which is the ideal platform for virtual currency schemes;
- c) the higher degree of anonymity compared to other electronic payment instruments that can be achieved by paying with virtual currencies;
- d) the lower transaction costs, compared with traditional payment systems;
- e) the more direct and faster clearing and settlement of transactions, which is needed and desired in virtual communities.

Therefore, by assuming that Bitcoin as virtual currency scheme will continue to grow, periodical examination of the developments is needed in order to consider the potential risks more carefully.

What types of risks might occur ?

Bitcoin as a virtual currency payment arrangement has evolved into “real” payment systems within the specific virtual community. In contrast to traditional payment systems, it is not regulated or closely overseen by any public authority. Participation in this scheme exposes their users to credit, liquidity, operational and legal risks within the virtual communities; but no systemic risk outside these communities can be expected to materialise in the current situation.

More precisely the following types of risks might occur by using the Bitcoin currency scheme³⁰:

-Credit risk-Users are exposed to credit risk in relation to any funds held on the virtual accounts, as it cannot be guaranteed that the settlement institution is able to fully meet its financial obligations when these are due or at any time in the future.

-Liquidity risk -Users are also exposed to liquidity risks if the settlement institution fails to meet any commitments it has made to provide liquidity to the participants as and when expected. In this regard, virtual currency schemes are very illiquid as a result of the low volumes traded. In the event of security incidents, the conversion of users' funds into real money would probably not occur quickly without a significant material loss in value.

³⁰ See :BIS, “The role of central bank money in payment systems”, CPSS Publications, No 55, August 2003

-Operational risk-Both payer and payee need to have accounts with the settlement institution and are therefore reliant on the soundness of its operational and business continuity.

-Legal risk-There are many legal uncertainties regarding virtual currency schemes. In virtual currency schemes, the lack of a proper legal framework substantially exacerbates the other risks. Even more, the legal uncertainty surrounding these schemes might constitute a challenge for public authorities, as these schemes can be used by criminals, fraudsters and money launderers to perform their illegal activities.

-Reputation risk -If the use of virtual currency schemes grows considerably, incidents which attract press coverage could have negative impacts on the reputations of central banks, if the public perceives the incidents as being caused, in part, by central banks not doing their jobs properly. As a consequence, this risk should be considered when assessing the overall risk situation of central banks.

If the Bitcoin might be consider as threat to price, financial and the payment stability of the modern economies?

Bitcoin as virtual currency scheme may be inherently unstable. But, due to its limited connection to the real economy, the low volumes traded and the lack of wide user acceptance for the time being, it seems that it still doesn't jeopardise financial stability of the economies which citizens use Bitcoin as a means of exchange or payment.

The limited volume of a Bitcoin in circulation also doesn't pose a risk for price stability at this stage, provided that the issuance of money continues to be as stable as it seems to be at present. In the short to medium term, no significant impact can be expected on the velocity of money. However, it is probably worth monitoring the interaction between virtual currencies and the real world.

Bitcoin schemes do not allow borrowing or lending. But this may change in the future. There is even speculation on how Bitcoin could evolve. Banks could, for instance, act as a depository for the wallet files that contain users' Bitcoins. The banks could then pay interest to those who hold the virtual currency with them. Alternatively the Bitcoin system could even start working as a fractional reserve system, extending credit over and above its actual reserves. However, the scheme's supporters are clearly opposed to this. These developments, if they came to pass, could indeed have a certain impact on financial stability in the future.

In the particular case of Bitcoin, which is a decentralised peer-to-peer virtual currency scheme, there is not even a central point of access, i.e. there is no server that could be shut down if the authorities deemed it necessary. As a consequence, governments and central banks would face serious difficulties if they tried to control or ban any virtual currency scheme, and it is not even clear to what extent they are permitted to obtain information from them.

Therefore, the main activities to prevent negative impact of the Bitcoin schemes might be seen in constant monitoring of the Bitcoin development and well as in creating a proper legal basis for virtual currency schemes in general. The legal basis of a payment system consists of framework legislation, as well as specific laws, regulations, and agreements governing both payments and the operation of the system. Bitcoin need to have proper legal framework, as well as a clear definition of rights and obligations for the different parties. Furthermore, the global scope that most of these virtual communities enjoy not only hinders the identification of the jurisdiction under which the system's rules and procedures should eventually be interpreted.

Conclusions

In the traditional markets , central governments manage the currencies and their performance based on a number of factors often questionable. However the introduction of the virtual currency schemes , especially the wider use of the most popular and the same time the most controversial virtual currency scheme called Bitcoin is characterized with the absence of central government whom decisions could induce phenomena of inflation or deflation and the anonymity of the transfer between entities in the network. In an extreme case, this virtual currency could have a substitution effect on central bank money if they become widely accepted.

The increase in the use of virtual money might lead to a decrease in the use of “real” money, thereby also reducing the cash needed to conduct the transactions generated by nominal income. In this regard, a widespread substitution of central bank money by privately issued virtual currency could significantly reduce the size of central banks' balance sheets, and thus also their ability to influence the short-term interest rates.

The substitution effect would also make it more difficult to measure monetary aggregates ,which might pose further risks to price and financial stability in the medium to longer term. Since there is still a limited volume of

a Bitcoin in circulation, the usage of Bitcoin can't be seen as a threat to the financial, payment and price stability worldwide.

Yet, the growing trend of wider use of Bitcoin currency requires continuous monitoring of its development and creating a proper legal basis for virtual currency schemes in general.

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